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Patent Claims

1. An exhaust gas aftertreatment device onboard a motor vehicle, comprising a reforming unit (1) for generating hydrogen by steam reforming, partial oxidation of hydrocarbons and/or mixed forms thereof, and at least one exhaust gas catalytic converter, the steam and residual oxygen which are required for the reforming preferably being derived from the exhaust gas, characterized in that the reforming unit (1) is arranged directly in the main exhaust gas stream (4) from an internal combustion engine.

2. The exhaust gas aftertreatment device as claimed in claim 1, characterized in that the at least one exhaust gas catalytic converter, which is preferably an NO_x storage catalytic converter (2) which removes nitrogen oxides from lean exhaust gas by storing them as the exhaust gas flows through it and generates N_2 by reducing the stored nitrogen oxides when reducing exhaust gas flows through it, is arranged in the main exhaust gas stream (4) downstream of the reforming unit (1), and furthermore at least one further exhaust gas catalytic converter, which is preferably an SCR catalytic converter (3) which reduces nitrogen oxides contained in the exhaust gas using NH_3 that has been generated by means of the nitrogen oxide storage catalytic converter, is arranged in the main exhaust gas stream (4) downstream of the NO_x storage catalytic converter (2).

3. The exhaust gas aftertreatment device as claimed in claim 1, characterized in that the at least one exhaust gas catalytic converter, which is preferably an SCR catalytic converter (3) which reduces nitrogen

oxides contained in the exhaust gas using NH_3 that has been generated by means of the nitrogen oxide storage catalytic converter is arranged in the main exhaust gas stream (4) downstream of the reforming unit (1), and furthermore at least one further exhaust gas catalytic converter, which is preferably an NO_x storage catalytic converter (2) which removes nitrogen oxides from lean exhaust gas by storing them as the exhaust gas flows through it and generates N_2 by reducing the stored nitrogen oxides when reducing exhaust gas flows through it, is arranged in the main exhaust gas stream (4) downstream of the SCR catalytic converter (3).

4. The exhaust gas aftertreatment device as claimed in claim 1, characterized in that the at least one exhaust gas catalytic converter is arranged in the main exhaust gas stream (4) downstream of the reforming unit (1), the exhaust gas catalytic converter having the functions of an NO_x storage and SCR catalytic converter (6).

5. The exhaust gas aftertreatment device as claimed in one of claims 2 to 4, characterized in that an oxidation catalytic converter is arranged downstream of the respectively last exhaust gas catalytic converter.

6. The exhaust gas aftertreatment device as claimed in one of claims 2 to 5, characterized in that a three-way catalytic converter (7) is arranged immediately downstream of the reforming unit as seen in the main direction of flow of the exhaust gas.

7. The exhaust gas aftertreatment device as claimed in claim 1, characterized in that the at least one exhaust gas catalytic converter, which is preferably a DENOX catalytic converter (8), is arranged in the main exhaust gas stream (4) downstream of the reforming unit (1).

8. The exhaust gas aftertreatment device as claimed in claim 7, characterized in that an NO_x storage catalytic converter (2) is arranged upstream or downstream of the DENOX catalytic converter (8).

9. The exhaust gas aftertreatment device as claimed in one of claims 1 to 8, characterized in that an exhaust gas recirculation is provided downstream of the reforming unit (1).

10. The exhaust gas aftertreatment device as claimed in one of claims 1 to 9, characterized in that the reforming unit (1) is designed as a catalytically active particulate filter.

11. A method for operating the exhaust gas aftertreatment device as claimed in claim 1 for reducing nitrogen oxides in exhaust gases from motor vehicles by reduction at a catalytic converter with hydrogen being supplied, the hydrogen required for the nitrogen oxide reduction being generated onboard the motor vehicle by steam reforming, partial oxidation of hydrocarbons and/or mixed forms thereof, the steam and residual oxygen which are required for the reforming originating from the exhaust gas, characterized in that the reforming is carried out directly in the main exhaust gas stream (4) from an internal combustion engine.

12. The method as claimed in claim 11, characterized in that the temperature of the reforming unit (1) is set by means of the air/fuel ratio, with the current oxygen concentration in the exhaust gas being determined with the aid of a wide-band lambda sensor.

13. The method as claimed in claim 12, characterized in that the reforming unit (1) is operated at an

air/fuel ratio in the range from approximately $0.5 < \lambda < 1.0$.

14. The method as claimed in claim 13, characterized in that a quantity of fuel which is fed to the reforming unit (1) is set engine-internally, by means of a secondary injection (5) and/or by a combination of the two options.